Purpose: Patient exposure to radiation from interventional coronary procedures (ICPs) is high. Dose optimization is in part based on comparison with reference levels (RLs). Current RLs, however, have been deduced from small or old multicentre studies. The purpose of this study was to evaluate current practices for patient radiation protection (RP) in French non-university public hospitals, which represent >30% of the national activity for ICPs, and 60% of the emergency cases.

Methods: RAY'ACT was a nationwide, multicentre survey. RP parameters from 35,257 coronary angiographies (CAs) and 28,604 percutaneous coronary interventions (PCIs) performed at 48 centres during 2010 and routinely registered in professional software were extracted and analysed retrospectively. Dose-area product (DAP), fluoroscopy time (FT), number of acquired frames (NF) and runs (NR), and cumulative dose to interventional reference point (CD-IRP) were analysed separately for CAs and PCIs (elective and ad hoc pooled). Emergency and complex procedures, associated with a high level of radiation, were not excluded.

Results: The table shows the new RLs, based on the 75th percentiles of the values for CA and PCI, and comparison with previous RLs.

RLs from	RAY'ACT (2010)	SENTINEL (2008)	EAIA (2007)	GACI-PDS (2006)	DIMOND (2003)
CA					
N	31,067	672	2,265	496	600
DAP, Gy. cm^2	45.2	45	49.4	57	56
FT, min	6.3	8	9	6	7
NF	769	700	1003	1270	876
CD-IRP, mGy	695	650	1900	–	–
PCI					
N	25,356	662	1,844	317	600
DAP, Gy. cm^2	94.6	85	122	94	110
FT, min	16.2	15	21	16	15
NF	1193	1000	1691	1355	1325
CD-IRP, mGy	1788	1500	2800	–	–

Conclusions: The RAY'ACT survey has allowed the definition of new RLs for DAP, FT, NF and CD-IRP for CA and PCI, based on a large study population. It confirms the trend toward a decrease in radiation doses and FT during CA. The lack of decrease in DAP and FT during PCI should be interpreted according to the likely increase in procedure complexity.

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Identification of mechanisms underlying very late stent thrombosis by optical coherence tomography imaging

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Background: Very late stent thrombosis (VLST) is a rare but severe complication of percutaneous coronary intervention. We sought to analyze the mechanisms involved in the pathophysiology of using optical coherence tomography (OCT) imaging techniques.

Methods: Patients with an acute coronary syndrome related to VLST from two catheterization facilities were included in this multicenter registry and underwent a standard coronary angiography and intra coronary OCT. Uncovered strut was defined as a strut of measured neointimal thickness equal to 0 µm. Intra stent neo atherosclerosis (ISNA) was defined as the combination of neointimal diffuse proliferation, lipid-laden intima with plaque organization and fibrous cap with no evidence of uncovered strut.

Results: A total of 1539 patients with acute coronary syndromes (ACS) were admitted in both centers between October 2010 and March 2012. Sixteen of these subjects (1.03%) presented a definite VLST (drug eluting stents: 38% of the cases), including n=8 subjects with OCT evidences of ISNA lesions and n=8 patients with lack of struts neointimal coverage.

We observed that the delay between the initial PCI and the thrombotic event was longer in ISNA subjects compared to the others (10.1±1.8 vs. 3.9±0.5 y, p=0.01). Moreover, a history of dyslipidemia was more frequent in the ISNA group (100% vs. 50%, p=0.04) and the mean baseline LDL-cholesterol value tended to be higher compared to the other group (1.36±0.16 vs. 0.95±0.14 g/l, p=0.07).

All lesions were treated by initial thrombectomy that was completed by redo stenting in n=7 ISNA patients (DES in 86% of the cases). No adverse cardiovascular event (cardiovascular death, reinfarction, urgent PCI or stroke) was observed during the first 30 days following VLST.

Conclusion: Our data show that ISNA is common in patients with VLST. These results suggest that OCT imaging is useful to identify the mechanisms underlying VLST and to help the clinical decision-making process.

035

Impact of operator learning curve on success of percutaneous coronary intervention for chronic total occlusions

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Purpose: Percutaneous coronary intervention (PCI) for Chronic Total Occlusions (CTO) is associated with a higher failure rate than PCI for other lesion subsets. The aim of this study was to assess the impact of operator learning curve on success rate of PCI for CTO.

Methods: The study included consecutive patients undergoing PCI for CTO at 3 tertiary cardiac centres between January 2004 and December 2011. To identify minimum case volume for optimum clinical benefit, CTO-PCI cases were chronologically ranked and stratified into 6 case volume groups, as 1 to 50 (beginner operators), 51 to 100, 101 to 150, 151 to 200, 201 to 250, >250, for several operators. A multivariable mixed effect logistic regression for clustered data was used to assess the impact of case volume on PCI failure after adjustment for patient characteristics, lesion difficulty graded by angiographic score, vessel site, procedural techniques.

Results: A total of 1261 patients, median 63 yrs-old (25th-75th percentile, 55-72), undergoing PCI for 1418 CTO were included. PCI success occurred in 1008 (71%) lesions. Crude success rate was 69.6%, 66.2%, 69.6%, 76.1%, 70.2%, 77.8% across the 6 ordered case volume groups, respectively, p=0.04. At multivariable logistic regression, increasing case volume across the six categories was significantly associated with successful PCI (odds ratio (OR) 1.22, 95% confidence interval (CI) 1.13.-1.32, p<0.001). The OR of success increased substantially and significantly with a case volume of at least 151 to 200, as compared to 1 to 50 case volume (2.09, 95% CI 1.18-3.70, p=0.012), reaching the highest value in case volume >250 (OR 2.85, 95% CI 1.87-4.34, p<0.001, while the increase in odds ratio for case volumes < 151, as compared to 1 to 50 case volume, did not reach the statistical significance.

Conclusions: Operator experience in PCI for CTO is an independent predictor of success. A minimum case volume >150 is required to increase significantly the chance of success compared to beginner operators

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In vivo monitoring of intra-coronary thrombus regression by serial optical coherence tomography analysis: feasibility and first-in-man results

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Background: Time-domain optical coherence tomography (TD-OCT) allows assessment of the anatomy and features of unstable coronary artery lesions,